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MONITORING OF *AGASTACHE CUSICKII* IN THE TENDOY MOUNTAINS OF SOUTHWESTERN MONTANA: ESTABLISHMENT REPORT

USDI BUREAU OF LAND MANAGEMENT
BUTTE DISTRICT
DILLON RESOURCE AREA

Prepared by:

James P. Vanderhorst
Montana Natural Heritage Program
1515 East Sixth Avenue
Helena, Montana 59620

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Prepared for:

USDI Bureau of Land Management
P.O. Box 3388
Butte, Montana 59702-3388

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INTRODUCTION

This report describes the establishment of a monitoring program for *Agastache cusickii* in the Tendoy Mountains of southwestern Montana. The population which is being monitored is located on a steep limestone talus slope above Big Sheep Creek in Beaverhead County. This occurrence, the only known for this species in Montana, was only recently discovered (Lesica et al. 1986). Despite further intense searching in the vicinity by Peter Lesica and myself during the summer of 1993 no other locations have been found (Vanderhorst and Lesica 1994). Although the U. S. Fish and Wildlife Service (1990) classified *Agastache cusickii* as 3C ("not subject to any identifiable threat"), the Montana Natural Heritage Program (Heidel and Poole 1993) classifies the species as S1 ("critically imperiled because of extreme rarity") in Montana.

Agastache cusickii (Cusick's giant-hyssop or horse-mint) is a member of the Lamiaceae (the mint family). It can be distinguished from the very common and widespread *Agastache urticifolia* by its dwarf habit and smaller leaves. Besides its apparently disjunct Montana occurrence, *Agastache cusickii* is found at scattered locations in the mountains of southeastern Oregon, northern and eastern Nevada, and central Idaho, in dry, rocky places, often on talus (Cronquist et al. 1984).

The talus where the plants are found in the Tendoy Mountains is located adjacent to a major gravel road, and in the past the site was quarried for road construction material. Removal of this material undoubtedly directly reduced the population area and may have also affected upslope habitat by reducing lateral support for the talus. In addition to *Agastache cusickii*, 3 other Montana Plant Species of Special Concern found on these slopes are *Hutchinsia procumbens, Mimulus suksdorfii,* and *Phacelia incana*. Although authorized quarrying seems to have been suspended in recent years, the BLM wished to establish a monitoring program to document habitat trend and any threats due to unauthorized quarrying. A monitoring system was established in the summer of 1993 through a challenge cost-share between BLM and the Montana Natural Heritage Program at the site.

The primary purpose of monitoring this site is to detect further degradation of habitat. This contrasts with monitoring of other populations of sensitive plants where the primary goal is to study the natural history traits of the species, population trends or management responses. The major threat to *Agastache cusickii* here is not its intrinsic reproductive capacity, but rather disturbance of habitat by people. A secondary benefit of this program will be to determine the species ability to recolonize previously disturbed habitat.

METHODS

A monitoring program for *Agastache cusickii* was initiated on July 6, 1993. The population being monitored is located on a slope above and across a gravel road from Big Sheep Creek, about 19 air kilometers (12 miles) southwest of Lima, in Beaverhead County, Montana (Figure 1). The legal description for the site is Township 15 South, Range 10 West, Section 10, North 1/2. The population is best reached by the gravel road which follows Big Sheep Creek from the town of Dell. The plants are located on southeast to west facing slopes and on flats along the road at an elevation of approximately 2,070-2,190 meters (6,800-7,200 feet). Although the steep loose talus at the site makes survey of the population difficult, it is estimated that the population covers over 40 hectares (over 100 acres) and consists of thousands of individual plants. Figure 2 is a topographic map showing the location and estimated boundaries of the population and features which are referenced in this report.

Three monitoring techniques are used: 1) a road log which documents the location of all recognizable past disturbances using a vehicle odometer, 2) photography, and 3) permanent transects which document the number of plants per area in and adjacent to disturbances. The first two techniques are designed to detect future disturbance to the site in its entirety, while the last technique focuses on much smaller areas and is designed to answer questions concerning the permanence of damage to the population. The transects will also detect future disturbance within their small areas.

1. Road Log

The location of the population along a road makes this straightforward method possible. The starting point is the bridge which crosses Big Sheep Creek near the eastern edge of the population (see Figure 2). The road was driven from east to west and odometer readings were used to document the location of past quarrying of the talus slope.

2. Photography

Photographic documentation was used in two ways. First, 15 overlapping shots of the entire site were taken from the road from its beginning near the bridge to its end 1 mile down the road to the west. Secondly, photos were taken of the 5 disturbances which are documented in the road log. At two disturbances (A and D) one meter lengths of rebar were driven into the ground at the base of the slope to permanently mark (barring vandalism or severe disturbance in the future) the location of the photo shots. A 6 meter metal rod painted white and marked in decimeter and meter increments was used as a scale. At each disturbance the rod was placed with its foot in contact with the rebar in the ground and leaned against the slope. One shot was taken of each disturbance at a square

Figure 1. Map of the vicinity, in Beaverhead County, showing the location of the population of *Agastache cusickii* being monitored, indicated by the large arrow in the lower left corner.

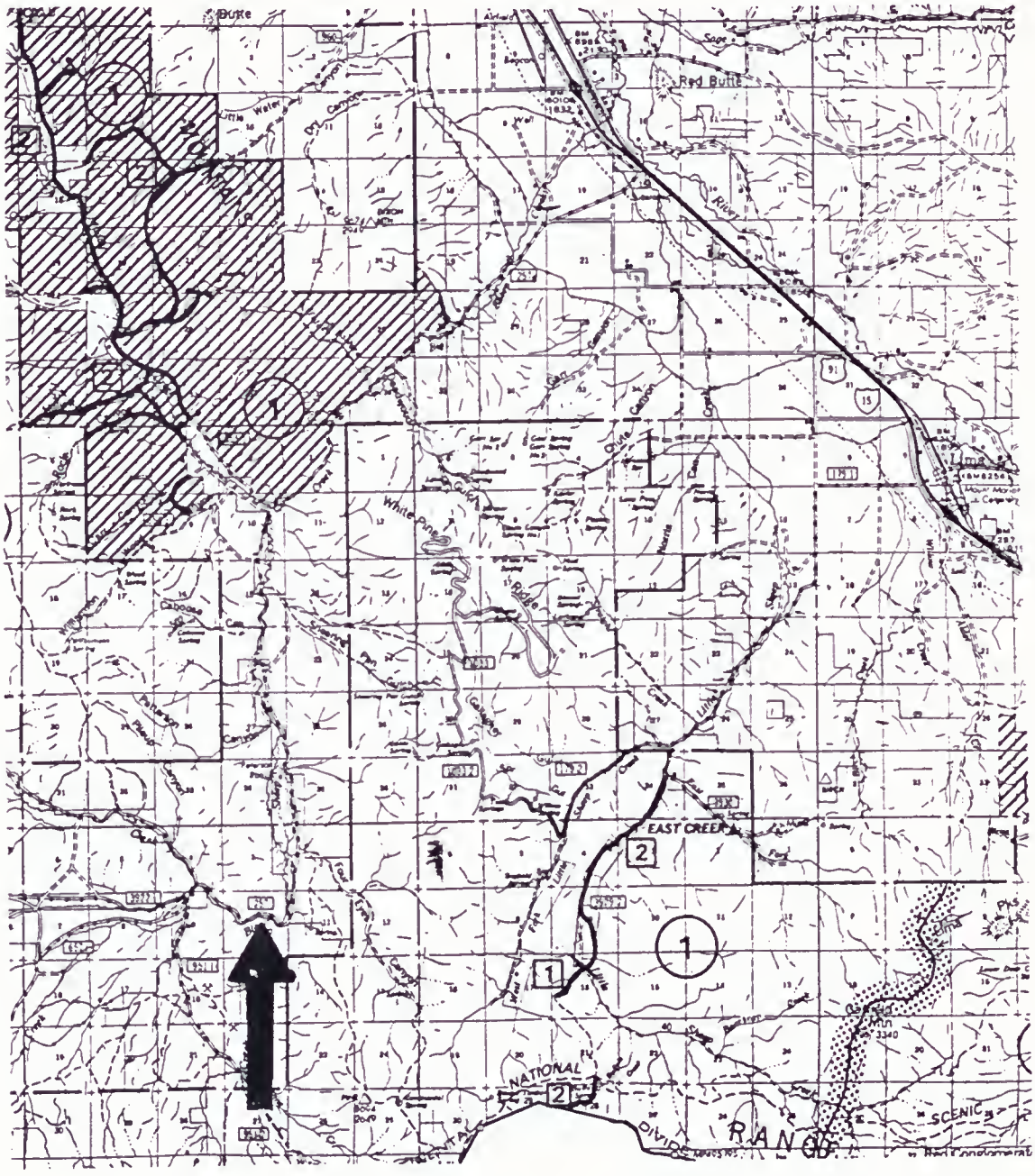
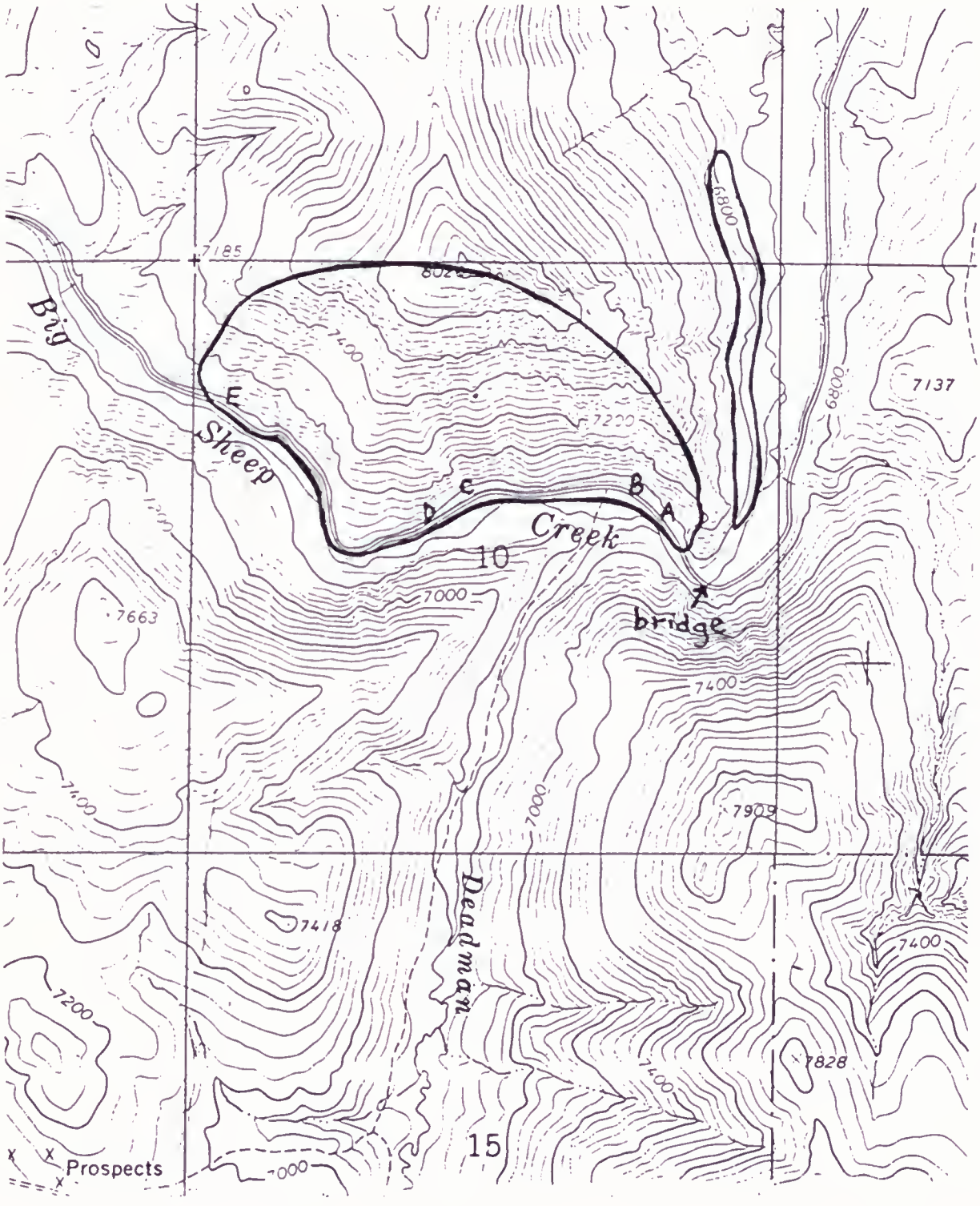


Figure 2. Portion of the U.S.G.S. Caboose Canyon quadrangle, 7.5 series (enlarged 141%), showing population boundaries and features referenced in this report. Capital letters A-E indicate the location of disturbances.



angle from the far side of the road. An oblique shot was also taken of disturbance A. Two other disturbances (B and C) were photodocumented in similar fashion in conjunction with the establishment of permanent transects, discussed next. The fifth disturbance, E, (possibly a natural occurrence) was photographed in one of the overlapping shots discussed above; the spot was not marked with rebar. Locations and descriptions of the photographs are given in the results section. The slides are attached to this report. All photos were taken on Kodachrome 64 ASA slide film using an Olympus OM-1 single lens reflex camera with a standard 50 mm lens.

3. Transects

Two permanent transects were established and initial readings taken. The methodology basically follows Lesica (1987) but on a larger scale and with less precision. The transects were located in areas disturbed by quarrying. Transect 1, at disturbance B, is entirely on disturbed ground while transect 2, at disturbance C, is oriented so that both disturbed and undisturbed ground is included. A "photo transect" was also established at disturbance B, directly adjacent to Transect 1. Both of these disturbances had been previously marked by the BLM with posts set in concrete, thus their relocation should be assured. Figures 3 and 4 are maps of the transects which show their locations and orientation in relation to the cemented posts. It should be noted that the orientation of the transects differs in the location of the origin; in transect 1 the origin is at the left, while in transect 2 and the photo transect the origin is at the right. In Figure 4 (transect 2), lines are drawn which show the divisions between the undisturbed slope, the quarried slope, and the quarry bottom.

Each transect is 25 meters long by 6 meters wide. The starting points (origins) of the transects were marked by 1 meter long rebar driven into the ground, with approximately 2 decimeters exposed above the surface. A second rebar was planted at each transect slightly more than 25 meters from the first. A meter measuring tape stretched between these two points forms the baseline of the transects. In transect 1 and the photo transect the base line is level and the measuring tape can be stretched tight but in transect 2 the baseline goes across uneven terrain, thus the tape must be carefully draped across the ground to insure accurate measurements (see slide # 29). A 6 meter measuring rod was constructed from two 10 foot sections of steel wiring conduit connected by a sleeve (these materials are available at building supply stores). The rod was spray painted white, decimeter increments were marked with black vinyl tape (although this precision was not used for these transects), and meter increments were marked with red tape. This rod was set square to the measuring tape (slide # 18) and used to delineate square meter quadrants within the transects.

Figure 3. Diagram showing the layout of transect 1 and the photo transect at disturbance B. Drawn to scale, the squares within the transect are 1 m^2.

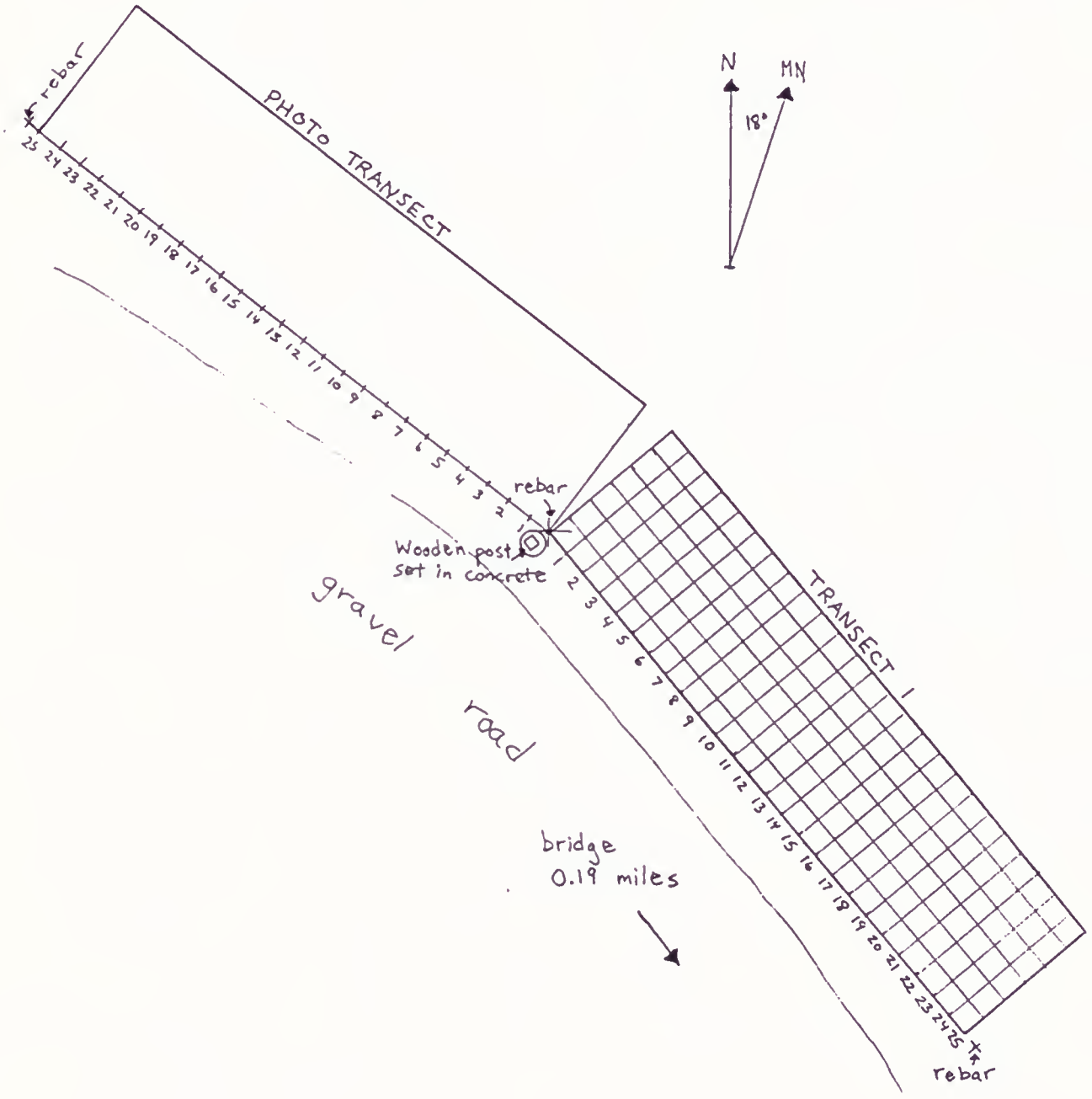
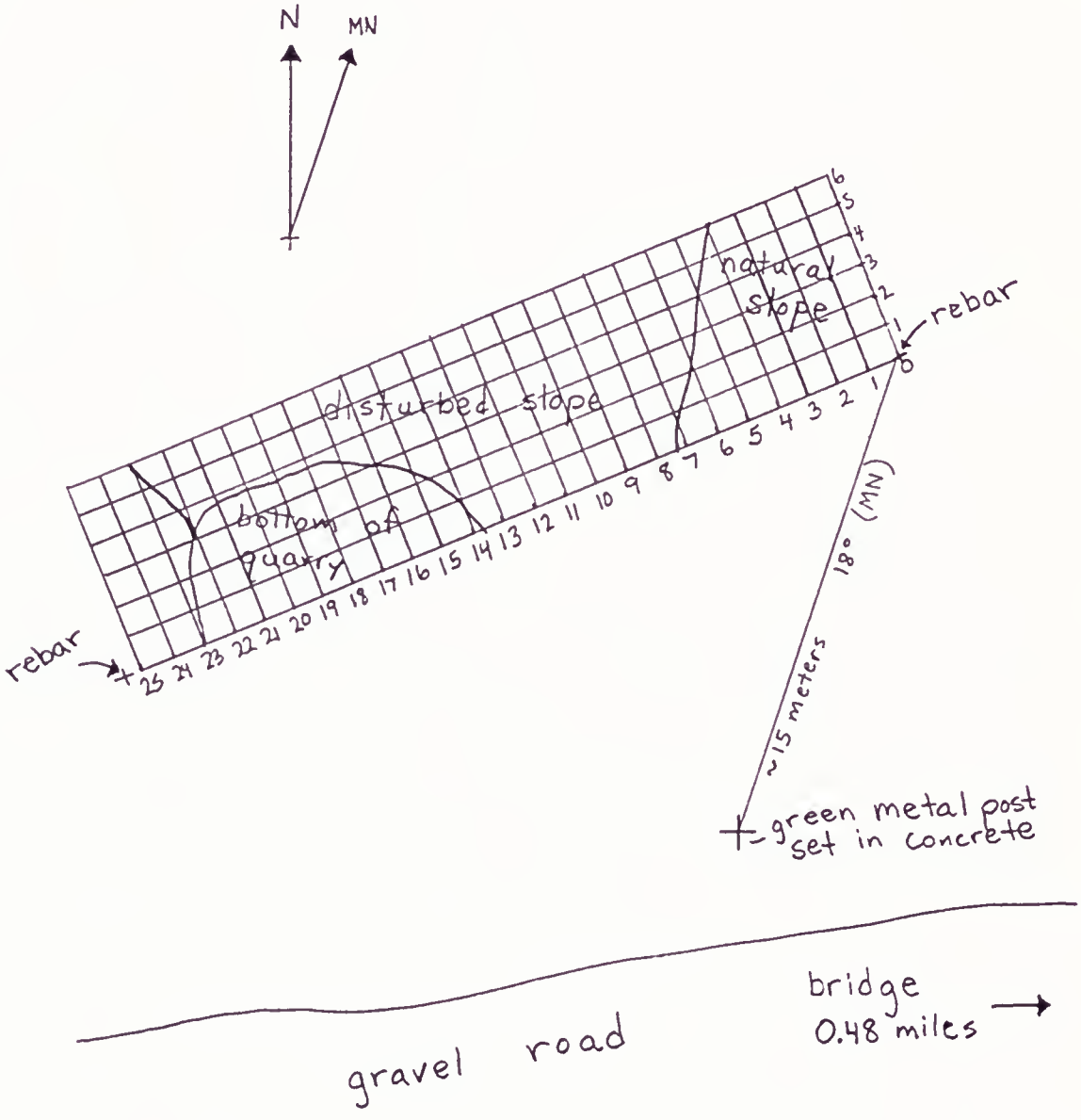


Figure 4. Diagram showing the layout of transect 2 at disturbance C. Drawn to scale, the squares within the transect are 1 m^2.



The data collected from the transects is the number of aerial stems of *Agastache cusickii* per each square meter quadrant in the form of a 25 X 6 matrix. Photographs of the transects were taken at a square angle from across the road with the measuring rod in place at 3 to 4 intervals along the baseline. In addition, oblique shots were taken of the transects. The photo transect was set up to the west and adjacent to Transect 1 (figure 3); plants were not counted in this transect but photos were taken from across the road at a square angle with the measuring rod in place at 3 intervals along the baseline.

RESULTS

1. Road Log

The following road log documents four disturbances points and a possible fifth disturbance. It also shows the general location of the two permanent transects and the location of photo shots.

odometer miles	description of feature
0	Starting point at Bridge across Big Sheep Creek.
0.05	Rock next to road, start of population.
0.14	Disturbance A, past quarrying. No plants are growing on the recently disturbed talus but plants are growing on the flat below the disturbance and on the undisturbed slope adjacent to the disturbance. Rebar planted, 2 photos taken.
0.19	Disturbance B, past quarrying. The BLM has marked the site with a wooden post set in concrete. Plants are established on the flat of the disturbance and a few on the disturbed slope. Location of Transect 1 and photo transect, 3 rebars planted, 9 photos taken.
0.48	Disturbance C, past quarrying. The BLM has marked the site with a green metal post set in concrete. There are no plants on the disturbed slope but there are some on the flat of the disturbance. Location of Transect 2, 2 rebars planted, 5 photos taken.
0.52	Disturbance D, past quarrying. Plants are becoming established on the disturbed slope. Rebar planted, photo taken.
0.75	Sharp bend in road separating subpopulations.
0.90	Possible old disturbance (E). Plants are established on slope and no recent digging is apparent. Photo taken.
1.0	End of population.

2. Photography

The following list describes the slides which are attached to this report.

assigned number	description
1-15	Overlapping shots of the entire roadside population area, taken from the road, in a generally westerly direction. Slide 1 was taken at the start of the population (from the bridge) and the following slides are consecutive, traveling in a generally westerly direction. Slide 15 shows "possible" disturbance E. The dog is Pasco.
16	Disturbance A taken from across the road at a square angle, with 6 meter measuring rod. Rebar is planted at foot of rod.
17	Oblique shot of disturbance A taken from the west on the road.
18	Method used to square the measuring rod to the baseline tape.
19	Transect 1 (disturbance B) with measuring rod in place at 1 decimeter on the baseline, showing location of wooden post set in concrete. Taken at a square angle from across road.
20	Transect 1 (disturbance B) with measuring rod in place at 10 meters on the baseline. Taken at a square angle from across the road.
21	Transect 1 (disturbance B) with measuring rod in place at 20 meters on the baseline. Taken at a square angle from across the road.
22	Transect 1 (disturbance B) with measuring rod in place at 25 meters on the baseline. Taken at a square angle from across the road.
23	Oblique shot taken from the west of entire transect 1 (disturbance B) with the measuring rod in place at 25 meters on the baseline.

24	Oblique shot taken from the east of entire transect 1 (disturbance B) with the measuring rod in place at 0 meters on the baseline, showing location of wooden post set in concrete.
25	Photo transect (disturbance B) with the measuring rod in place at 10 meters on the baseline. Taken at a square angle from across the road.
26	Photo transect (disturbance B) with the measuring rod in place at 20 meters on the baseline. Taken at a square angle from across the road.
27	Photo transect (disturbance B) with the measuring rod in place at 26 meters on the baseline. Taken at a square angle from across the road.
28	Oblique shot of transect 2 (disturbance C) showing location of green metal post set in concrete. Measuring rod is in place at 0 meters on the baseline.
29	Transect 2 (disturbance C), showing how the baseline tape is draped across the ground.
30	Transect 2 (disturbance C) with measuring rod in place at 4 meters on the baseline, showing the "cutline" between the undisturbed slope and the quarry. Taken at a square angle.
31	Transect 2 (disturbance C) with measuring rod in place at 16 meters on the baseline. Taken at a square angle.
32	Transect 2 (disturbance C) with measuring rod in place at 24 meters on the baseline. Taken at a square angle.
33	Disturbance D with 6 meter measuring rod. Rebar is planted at foot of rod. Taken at a square angle from across the road.

3. Permanent Transects

Data from the first reading (July 6, 1993) of the permanent transects is presented in Tables 1 (transect 1) and Table 2 (transect 2). Data are the number of aerial stems in each square meter quadrant. The matrices are oriented in the same manner as they were mapped (Figures 3 and 4). Thus for transect 1 the origin is on the left and the baseline is on the bottom, and for transect 2 the origin is on the right with the baseline on the bottom.

Table 1. Data matrix for transect 1.

0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	4	0	0	0	0	1	0	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5	2	3	3	0	8	1	2	2	0	0	2	0	2	0	7	1	0	1	0	0	0	0	0
7	3	3	4	1	2	1	3	0	1	1	4	1	0	5	2	2	7	0	2	2	2	2	0	5

Table 2. Data matrix for transect 2.

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	0	0
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	8	2	3	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
1	0	5	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	0
1	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0

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Lesica, P. et al. 1986. Noteworthy collections, Montana. Madrono 33: 310.

Lesica, P. 1987. A technique for monitoring nonrhizomatous, perennial plant species in permanent belt transects. Natural Areas Journal 7: 65-68.

Vanderhorst, J. and P. Lesica. 1994. Sensitive plant survey in the Tendoy Mountains, Beaverhead Couty, Montana. Unpublished report to the Bureau of Land Management. Montana Natural Heritage Program, Helena.

Photo 1. The first of 15 overlapping shots of the roadside population, the eastern edge. All of these shots are taken facing in a general westerly direction.

Photo 2. Number 2 of 15 overlapping shots, showing disturbance A.

Photo 3. Number 3 of 15 overlapping shots, showing disturbance B. The wooden post set in concrete can be seen at the base of the disturbance directly above the dog's hind legs.

Photo 4. Number 4 of 15 overlapping shots.

Photo 5. Number 5 of 15 overlapping shots.

Photo 6. Number 6 of 15 overlapping shots.

Photo 7. Number 7 of 15 overlapping shots.

Photo 8. Number 8 of 15 overlapping shots.

Photo 9. Number 9 of 15 overlapping shots, showing disturbance C. The metal pot set in concrete is clearly visible near the bottom center.

Photo 10. Number 10 of 15 overlapping shots.

Photo 11. Number 11 of 15 overlapping shots.

Photo 12. Number 12 of 15 overlapping shots.

Photo 13. Number 13 of 15 overlapping shots.

Photo 14. Number 14 of 15 overlapping shots.

Photo 15. Number 15 of 15 overlapping shots, showing possible disturbance D. The western edge of the population.

Photo 16. Disturbance A taken from across the road at a square angle, with 6 meter measuring rod. Rebar is planted at foot of rod.

Photo 17. Oblique shot of disturbance A taken from the west on the road.

Photo 18. Method used to square the measuring rod to the baseline tape.

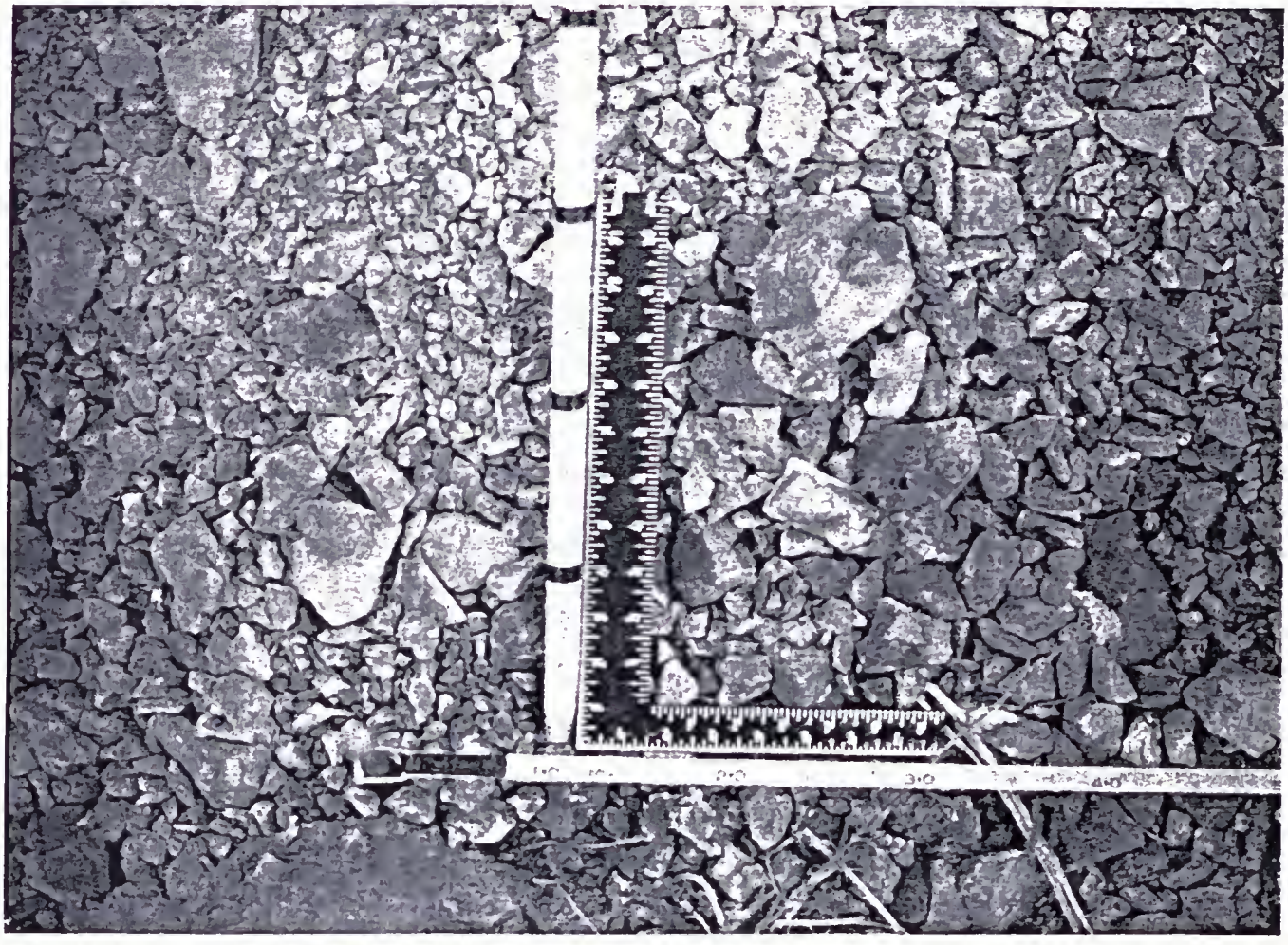


Photo 19. Transect 1 (disturbance B) with measuring rod in place at 1 decimeter on the baseline, showing location of wooden post set in concrete. Taken at a square angle from across road.

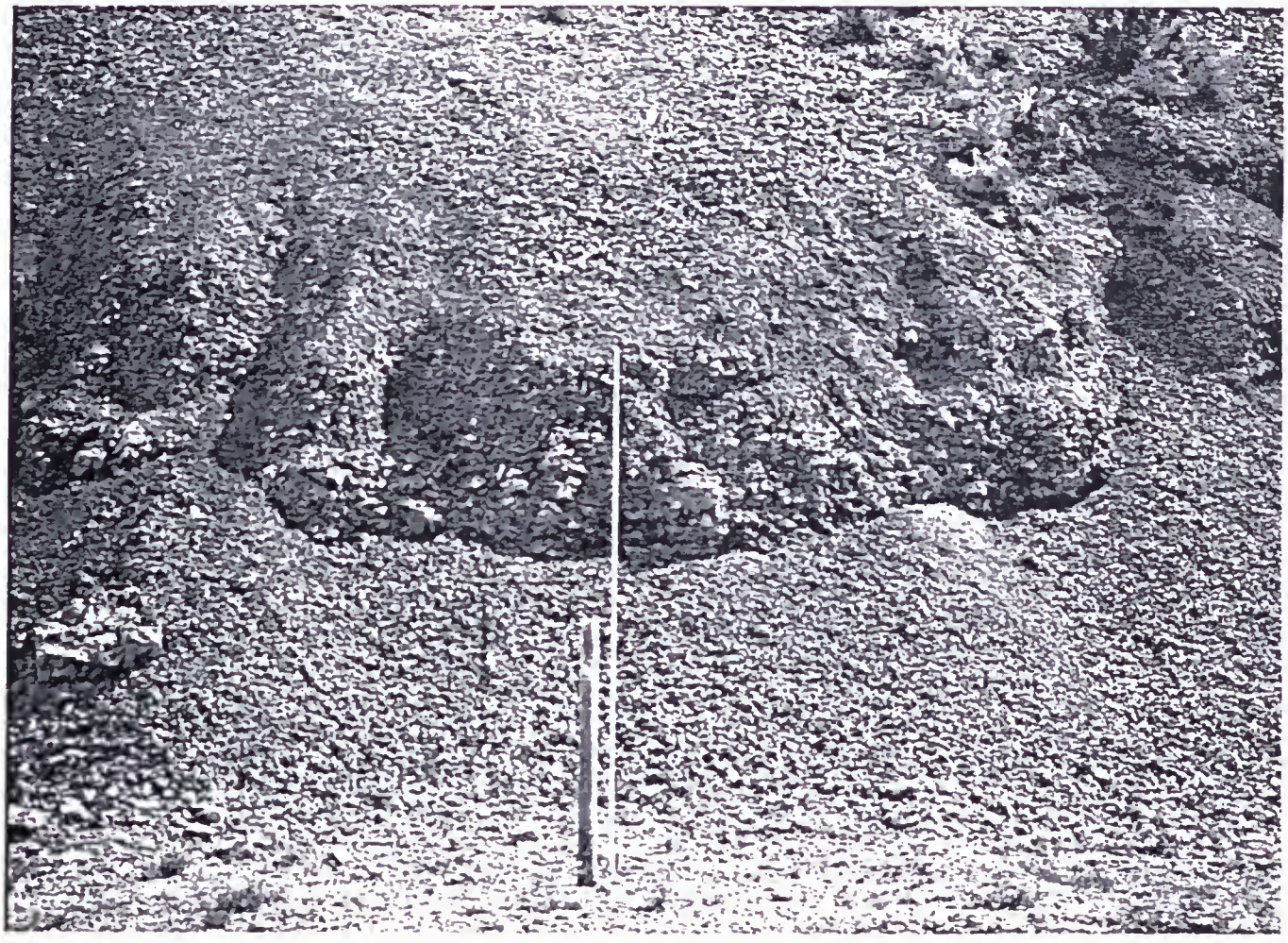


Photo 20. Transect 1 (disturbance B) with measuring rod in place at 10 meters on the baseline. Taken at a square angle from across the road.

Photo 21. Transect 1 (disturbance B) with measuring rod in place at 20 meters on the baseline. Taken at a square angle from across the road.

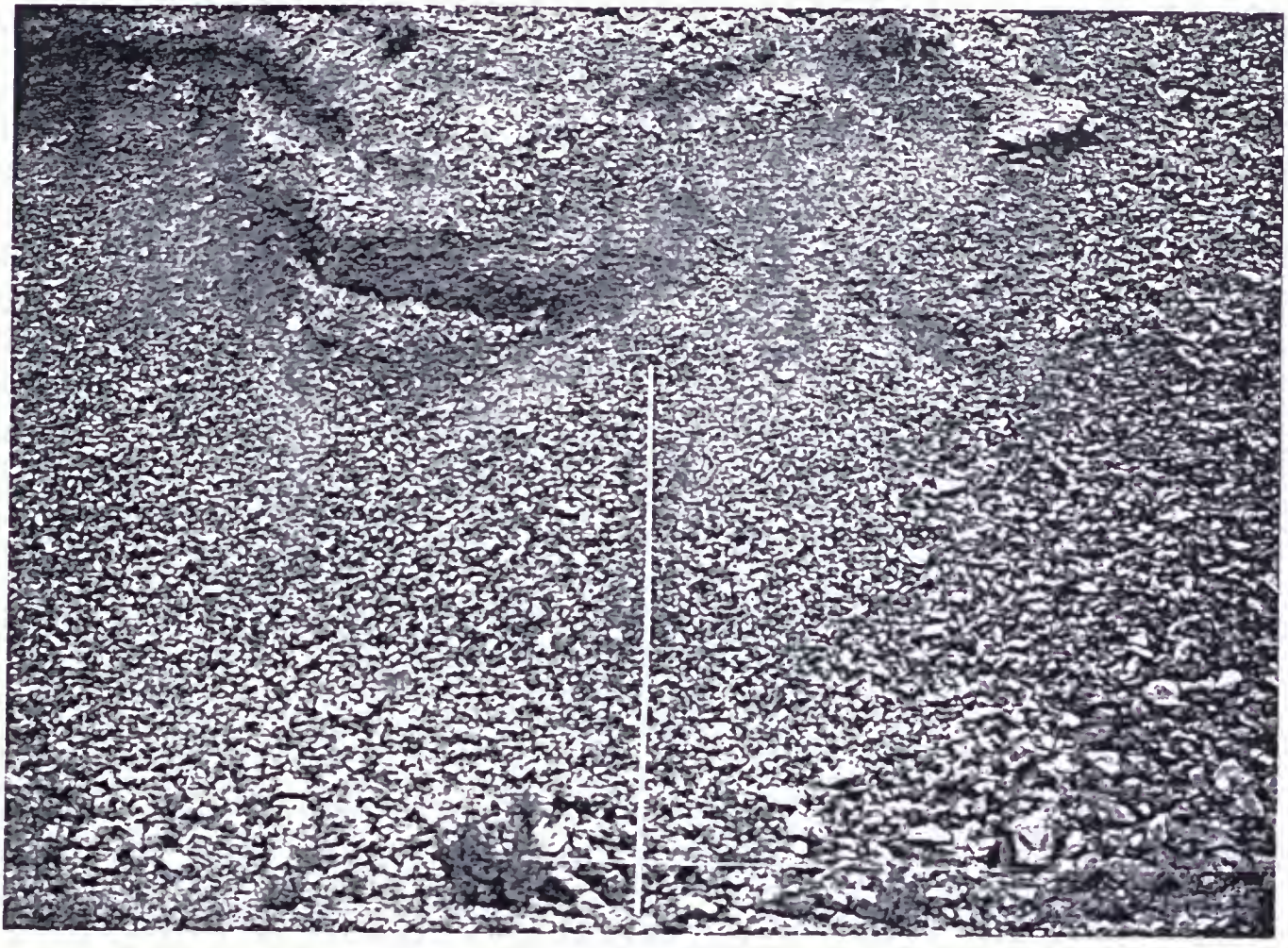


Photo 22. Transect 1 (disturbance B) with measuring rod in place at 25 meters on the baseline. Taken at a square angle from across the road.

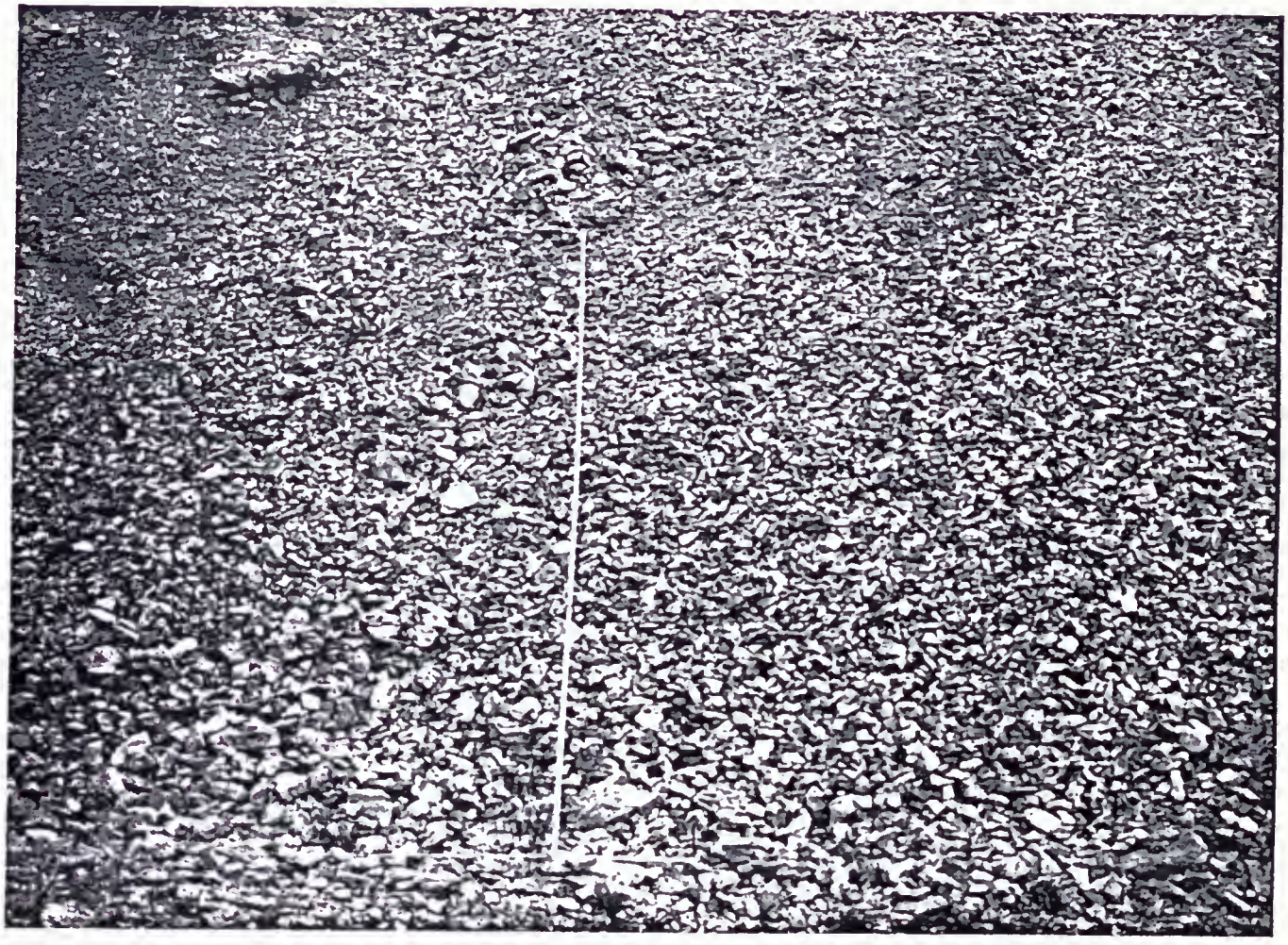


Photo 23. Oblique shot taken from the west of entire transect 1 (disturbance B) with the measuring rod in place at 25 meters on the baseline.

Photo 24. Oblique shot taken from the east of entire transect 1 (disturbance B) with the measuring rod in place at 0 meters on the baseline, showing location of wooden post set in concrete.

Photo 25. Photo transect (disturbance B) with the measuring rod in place at 10 meters on the baseline. Taken at a square angle from across the road.

Photo 26. Photo transect (disturbance B) with the measuring rod in place at 20 meters on the baseline. Taken at a square angle from across the road.

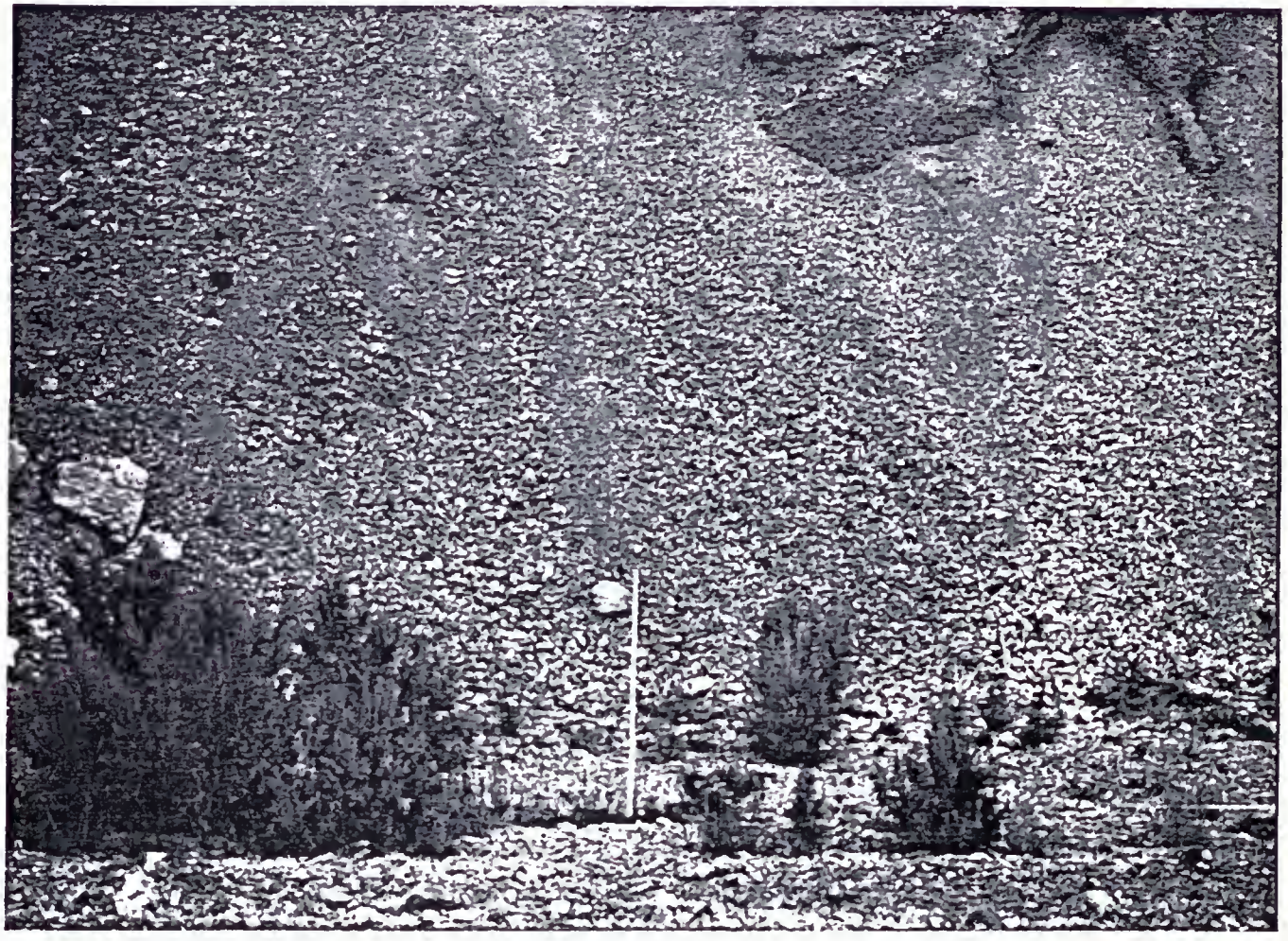


Photo 27. Photo transect (disturbance B) with the measuring rod in place at 26 meters on the baseline. Taken at a square angle from across the road.

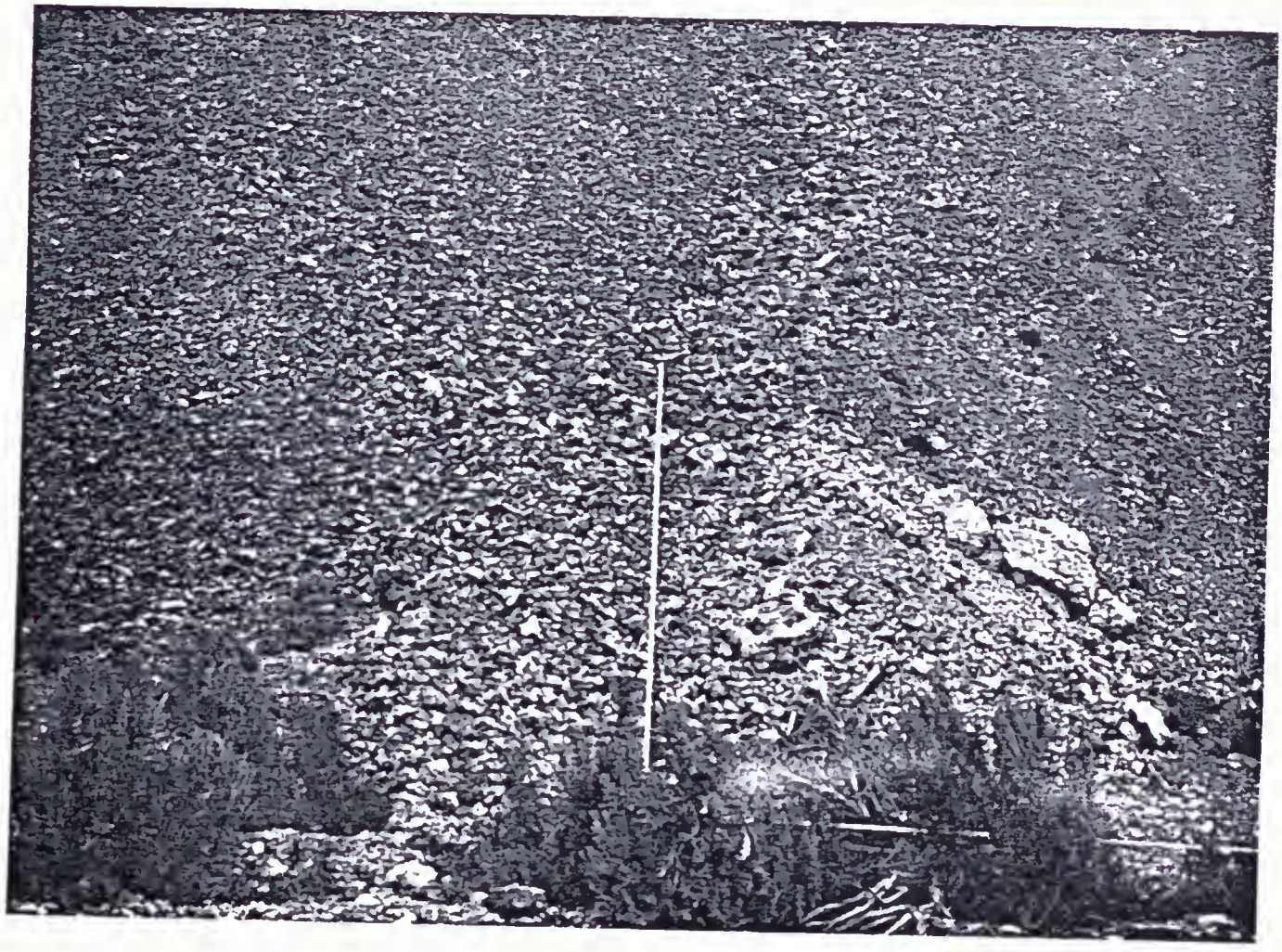


Photo 28. Oblique shot of transect 2 (disturbance C) showing location of green metal post set in concrete. Measuring rod is in place at 0 meters on the baseline.

Photo 29. Transect 2 (disturbance C), showing how the baseline tape is draped across the ground.

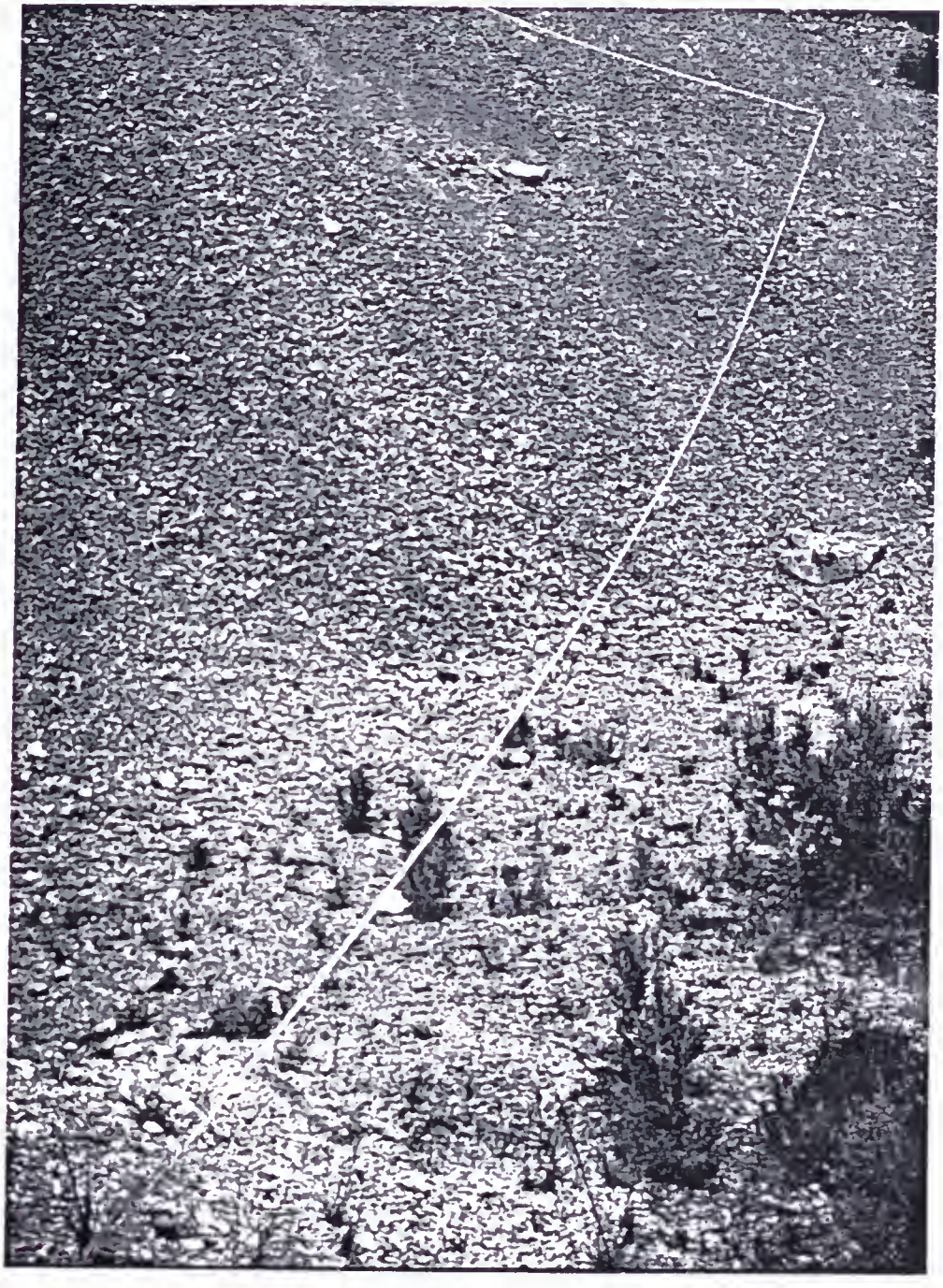


Photo 30. Transect 2 (disturbance C) with measuring rod in place at 4 meters on the baseline, showing the "cutline" between the undisturbed slope and the quarry. Taken at a square angle.

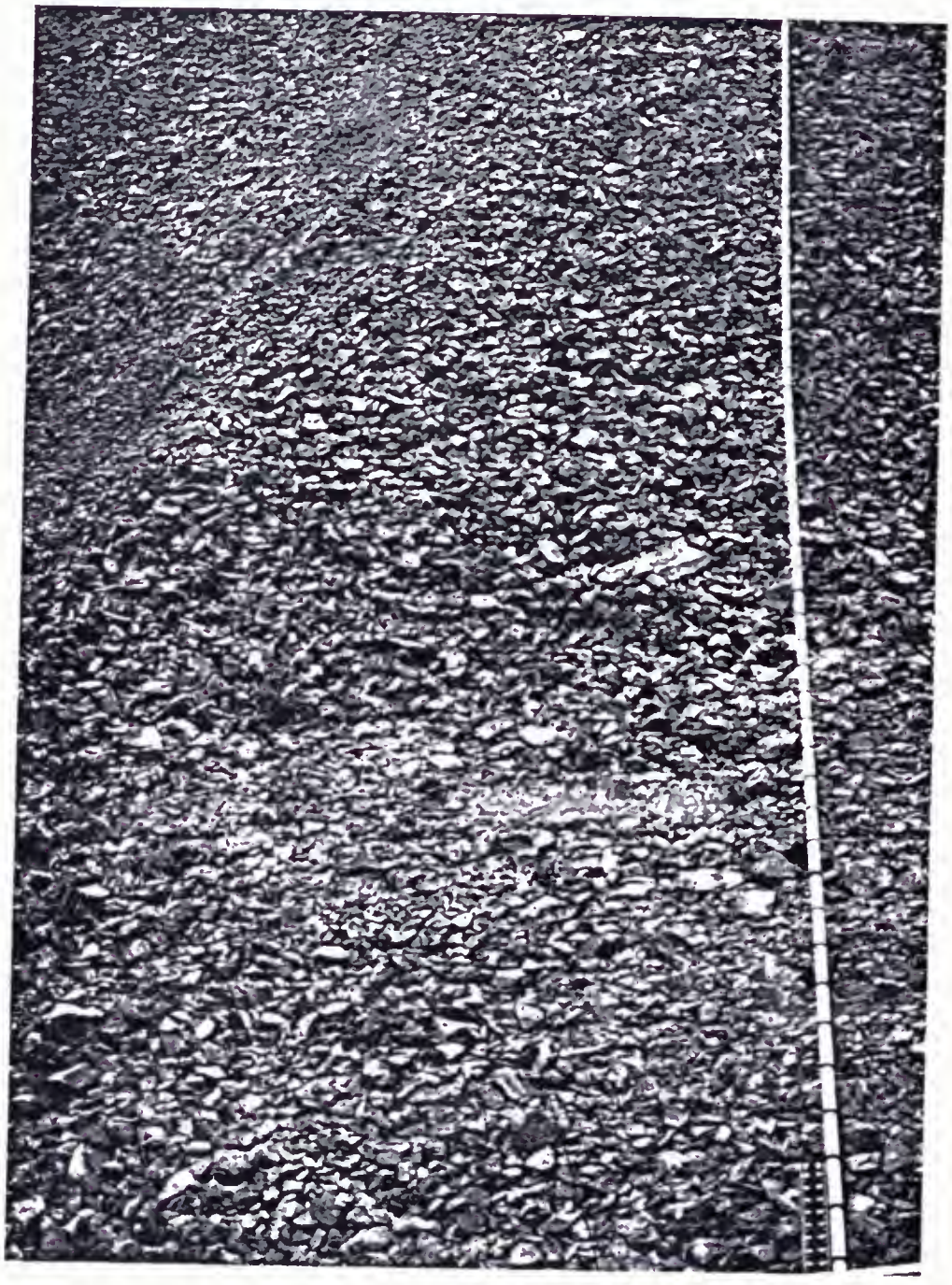


Photo 31. Transect 2 (disturbance C) with measuring rod in place at 16 meters on the baseline. Taken at a square angle.

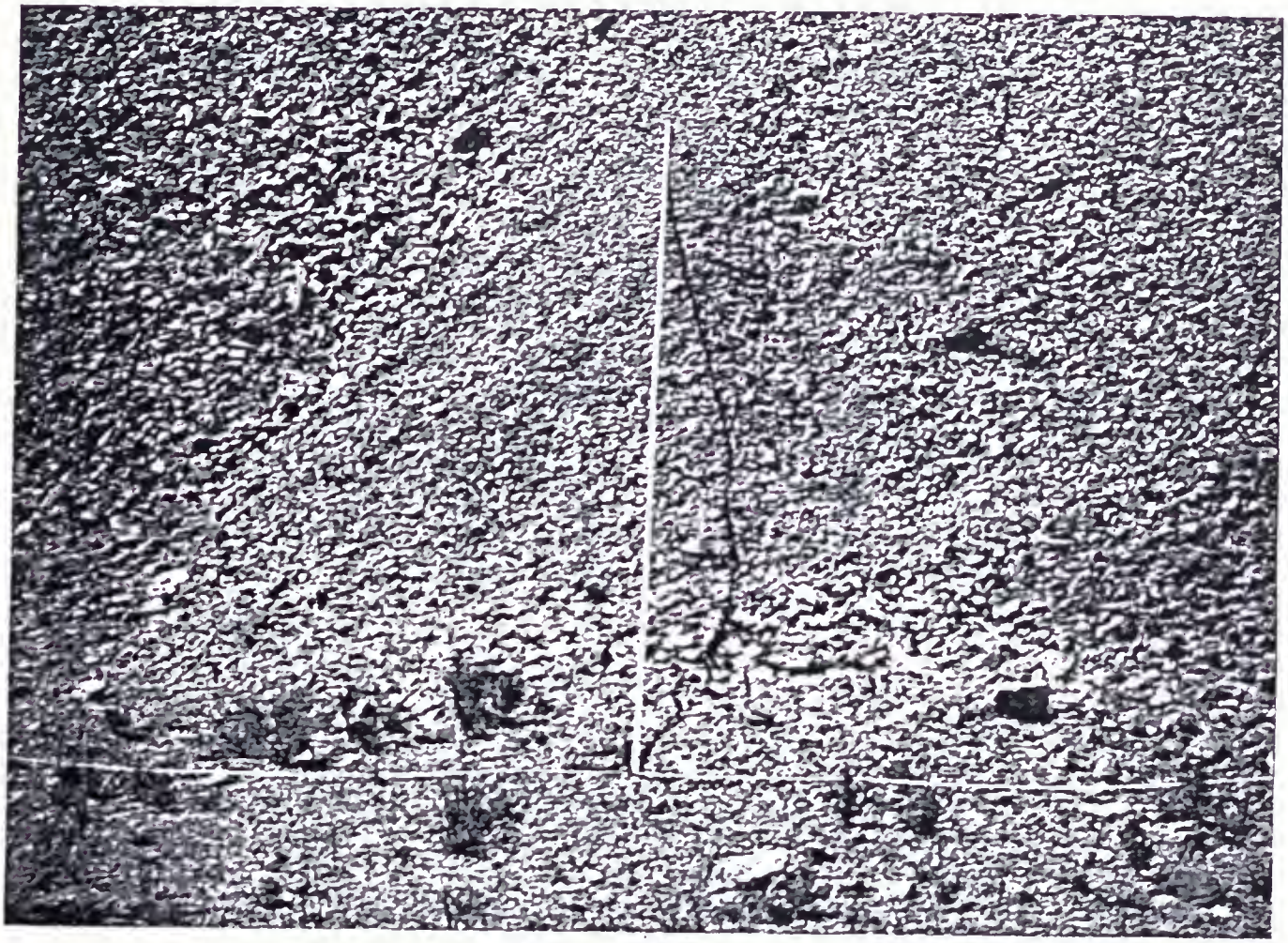


Photo 32. Transect 2 (disturbance C) with measuring rod in place at 24 meters on the baseline. Taken at a square angle.

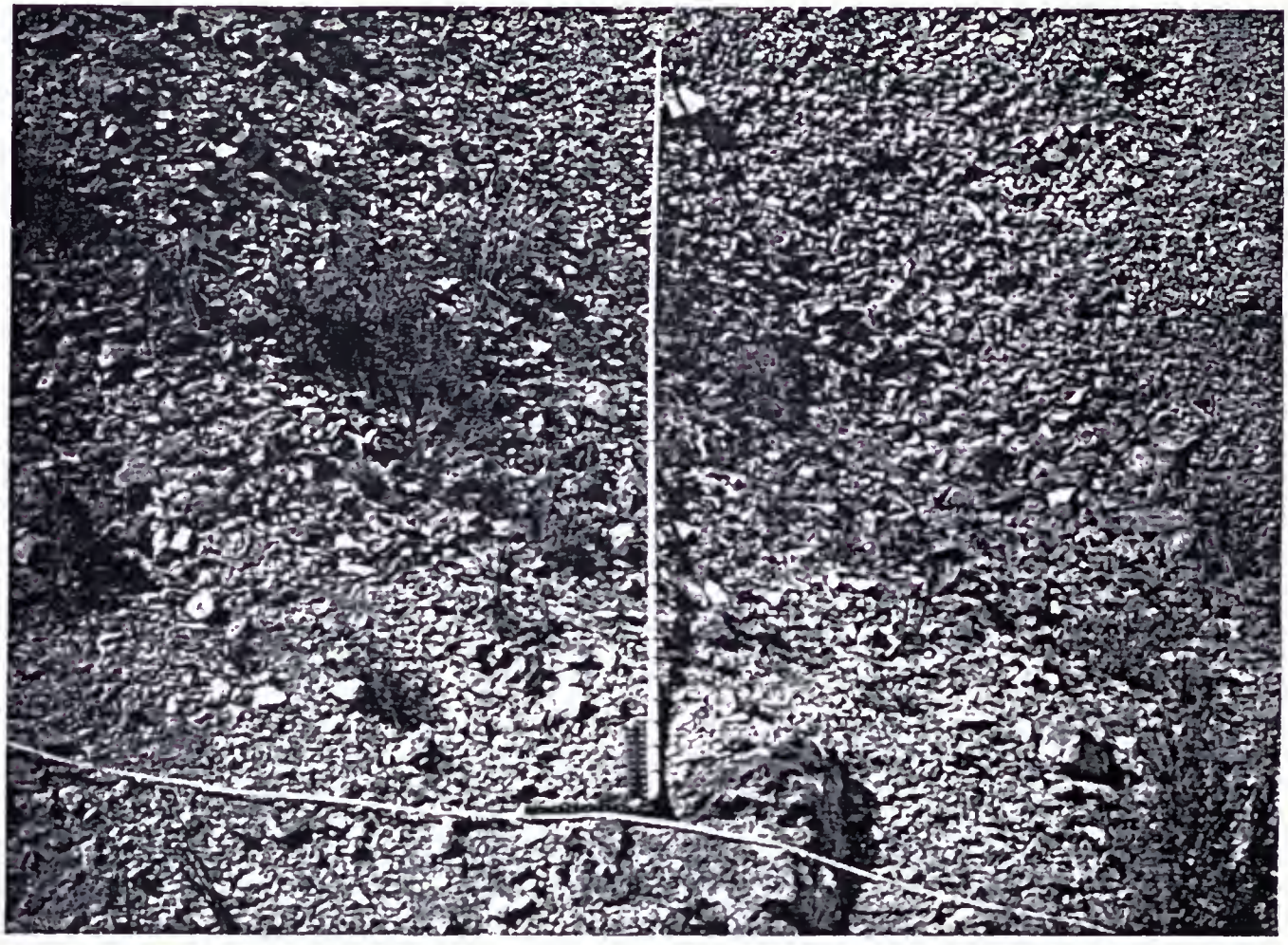
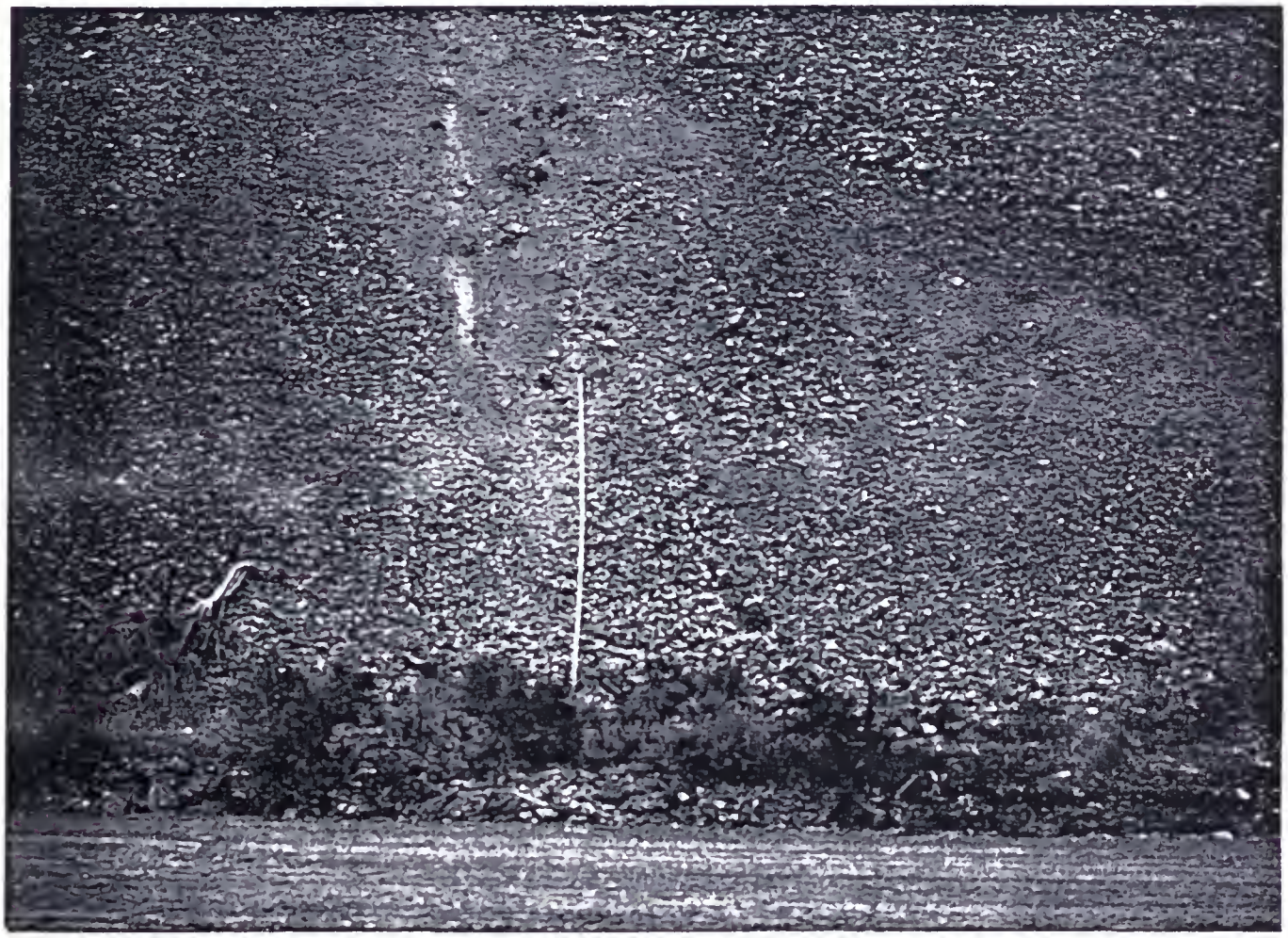


Photo 33. Disturbance D with 6 meter measuring rod. Rebar is planted at foot of rod. Taken at a square angle from across the road.



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